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Exploring the dynamic nature of the evolution of Building Environmental Assessment Methods (BEAMs): a call for a diachronic analysis of BEAMs

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ABSTRACT

The dynamic interactions between stakeholders from diverse backgrounds with interest in green building have led to the emergence of various collective groups of actors promoting different Building Environmental Assessment Methods (BEAMs). The corollary is the emergence of a wide array of competing, conflicting, and sometimes, complimentary BEAMs. Yet, relatively little attention has been paid to how these BEAMs have been developed – how the contentious relationship between actors over the meaning of 'green building' have influenced the content and development of BEAMs, and why stakeholders have coalesced into different groups promoting different BEAMs. Drawing on the theory of Strategic Action Fields we show how actors have jostled for position and engaged with each other to advance their interests and supported BEAMs that resonate with their core ideologies. We explain how the plurality of espoused definitions of green building, and actors' strategies to promote and support a conceptualization of green building that serve their interests, have culminated in the presence of multiple BEAMs and a struggle for market dominance. We question what this contentious relationship means for the future of green building and the development of BEAMs. The paper sets an agenda for the need to explore the historical context from which BEAMs have emerged.

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Introduction

Increasing social awareness of sustainability issues together with a growing understanding of the environmental impact of the built environment has put sustainable development firmly on the construction sector agenda. The rise of concepts such as 'green building', 'sustainable construction', 'sustainable building', and various other neologisms encapsulates industry actors' ways of making sense of, and conceptualizing, the overarching concept of 'sustainable development'. Of all the various buzzwords, 'green building' has gained wide popularity, rising as a label for buildings that are deemed environmentally friendly, as well as for associated practices. In most countries, initial attempts by stakeholders to aid the transition to sustainability focused on developing comprehensive methods of communicating green building features among industry professionals. These methods were designed to categorize the vast range of environmental criteria and to assign appropriate indicators and weightages to aid the achievement of sustainability goals. The emergence of Building Environmental Assessment Methods (BEAMs) in the early 1990s is one such attempt (Dammann and Elle, 2006). Their appeal was in no small way built on how they can be used to operationalize the rather elusive concept of 'green building', and provide a degree of objectivity in classifying practices as 'sustainable' or 'unsustainable' (Schweber, 2014).

Initially, the main objective for establishing BEAMs was to guide the delivery of green buildings (see Ding, 2008). Nowadays, BEAMs have risen to become 'green building standards' (cf. Schindler, 2010) and are increasingly being used as policy instruments by national governments (Schweber, 2013). In Hong Kong, for example, two assessment and certification schemes are currently dominant – one domestic, the 'Hong Kong Building Environmental Assessment Method' (HK-BEAM); and one imported, the 'Leadership in Energy and Environmental Design' (US-LEED). There is also a specialized Indoor Air Quality (IAQ) Certification Scheme. Similarly, in the US Building industry, the US-LEED co-exists with the Green Globes and other specialized assessment schemes. In the UK, the Building Research Establishment Environmental Assessment Method (BREEAM) is generally recognized as the national standard (Schweber, 2013), and the Green Mark Scheme has since 2008 been used as a standard for development approval for building projects in Singapore (BCA, 2016).

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Many countries now either have, or are in the process of developing, their own local assessment method(s) (Cole and Valdebenito, 2013). Yet, while these are increasingly upheld as standards for green building, with a view that they could possibly provide a common language to guide the delivery of green buildings (Dammann and Elle, 2006) the series of events leading to their development and establishment has received very little attention in academic research. Focus has instead been on the formal features of BEAMs and comparable methods (e.g. Cole, 2005; Haapio and Viitaniemi, 2008; Kajikawa *et al.*, 2011). The little attention that has been given to the historical context from which they have emerged, and how the institutional context in which they are embedded has evolved over time, is surprising. Specifically, the dearth of research exploring how the emergence of BEAMs has played out in the building industry, and how certain industry actors have influenced their development. Exploring these actions from a historical perspective provides a window into the shift towards sustainability in the building industry, such as how industry actors have come to categorize environmental criteria, and why certain green building practices have been prioritized ahead of others. It also allows for a more in-depth understanding of the contents of the assessment methods.

Following on from the above, we set out to provide a theoretical perspective on the emergence of BEAMs, and how the actions of stakeholders with vested interests in green building have culminated in the emergence of various collective groups of actors promoting different BEAMs in the same market. Our point of departure is that the support these assessment methods receive from industry actors and various other interest groups (economic, social, political, etc.) influence their development and establishment as 'green building standards'. We use the theoretical lens of Strategic Action Fields (SAFs) (Fligstein and McAdam, 2012) to explain the coalescence of different groups of stakeholders around different assessment methods. This lens allows for explanations of how actors with varied levels of resource and influence have succeeded, or not, in promoting a conceptualization of green building that advances their interests. The discussion rests on the assumption that actors are motivated by the desire to maximize their influence over the development and establishment of assessment methods. They do this by acting strategically to mobilize other actors to support a conceptualization of green building that serves their interest – that is, promoting a particular framing of green building that resonates with their professional values and norms, or that serve to give them a competitive advantage in the industry.

The paper is conceptual in nature and draws on recent trends and observations from research work in various geographical contexts in order to provide a new perspective on how to view BEAMs in the building industry. The paper, thus, provides a theoretical exposition of an analytical nature; moving beyond providing an account of the emergence of BEAMs to presenting a particular interpretation of how they came into being. We begin with a brief historical introduction of BEAMs. This section is devoted to exploring the development of BEAMs with a focus on their content, function, and the diversity of actors involved in operationalizing the green building concept. Particular attention is given to the challenge of achieving a consensus among the diverse interested parties, and the improbability of designing a single assessment method that could represent the interests of all involved. The next section introduces our theoretical lens, the theory of fields (Fligstein and McAdam, 2011, 2012). Next, we explore the role of industry stakeholders, and efforts made by some to mobilize actors from different backgrounds to create, establish, and further develop BEAMs. We use the theory to shine a light on how the actions of industry actors have led to the creation and establishment of BEAMs and explain how power struggles among stakeholders over the framing of green building has culminated in the emergence of multiple assessment schemes in the same market. We conclude with reflections on the significance of exploring the historical context from which BEAMs have developed; making a case for exploring green building as a historical construct.

Building environmental assessment methods: a brief overview

Up until the 1980s, the building industry lacked a common means of communicating environmental measures across industry practitioners. Environmental issues were dealt with on an ad hoc basis, with individual actors responding to particular issues as they arose (Theaker and Cole, 2001). Simple qualitative templates, or checklists, were used to communicate environmentally friendly practices. BEAMs, therefore, emerged in the 1990s to provide a more rigorous platform to rate environmental performance; one which could at least reflect the relative importance of different environmental criteria. Nowadays, several assessment methods have been developed for various levels of assessment; from cities, neighbourhoods, individual buildings, to building components, materials, and appliances (cf. Ding, 2008). These assessment methods provide a framework for stakeholders to coalesce around common standards to measure the environmental performance of buildings. They can be conceptualized as a technique with assessment as one of its core functions, which is accompanied

by some form of third-party registration or certification. BEAMs invariably consist of a framework of categories corresponding to different aspects of green building. Among various other functions, the use of BEAMs ensures the documentation of performance for rigorous independent review. Thus, serving as a powerful motivator for practitioners to undertake an analysis of alternative designs and building practices. By providing a structured approach to communicate performance indicators across diverse professional jurisdictions, the discussions BEAMs generate have been reported as potentially being able to affect change in the culture and collective knowledge of the industry and how practitioners engage with each other (cf. Schweber, 2014).

To foster the communication of environmental criteria across diverse professional fields, the development of BEAMs has sought to provide a common language upon which industry stakeholders can agree. This has necessitated the participation of, and input from, various stakeholders, as well as co-operation and co-ordination across professional and organizational boundaries (Bresnen, 2013). Considering the wide variety of environmental issues related to buildings, and the fact that some are unfamiliar to design professionals and esoteric to most industry actors, one major question in the development of assessment methods is how green building goals are arrived at. In other words, who decides which environmental criteria best represent what a green building should accomplish? Deciding on specific environmental indicators, for example, IAQ and pollution, energy and water management, to articulate the ideas of the myriad actors involved in green buildings is not a trivial task. There is also the challenge of deciding on which detailed practices could best measure the various environmental indicators and which indicators to prioritize; that is, what weightage criteria or rating to use for indicators (see Dammann and Elle, 2006).

Naturally, the above-described decisions are heavily influenced by national sustainability goals. But they are also based on the advice of industry experts. Consultations are undertaken and technical teams are usually formed to engage various stakeholders in the development process for new BEAMs, and/or to localize imported schemes from other countries (see Cole, 2011). For example, in Hong Kong, the BEAM steering committee, champions the development of the HK-BEAM (HK-BEAM Society, 2016). This is a technical committee made up of representatives from various stakeholder groups in the industry. Since its establishment in 1995, the committee has overseen the development of the various versions of HK-BEAM used in the industry. Similarly, in the USA, the decision to develop the US-LEED was championed by the US-Green Building Council (US-GBC), and the developmental process of new versions of the US-LEED is informed by comments from members and stakeholders on various drafts prepared by the US-GBC. This consensus-based approach has remained a constant feature throughout LEED's evolution (Cole, 2006).

The above examples show efforts by developers and owners of BEAMs to foster consensus among the multitude of stakeholders involved in green building. This means taking into account multiple viewpoints and objectives in order to achieve broad industry-wide consensus around a particular method of assessment. Yet, whether a single assessment method can facilitate the dialogue on environmental assessment, and be an integral part of decision-making for green building is heavily debatable. There is the question of how the diverging interests and priorities of involved stakeholders could influence the categorization of the myriad environmental criteria related to buildings.

Developments in Hong Kong and the USA

Two different geographical situations are explored in this paper to explain the actions of industry actors regarding the establishment of BEAMs. Here we provide an initial sketch. The objective is to illustrate how different methods have been established by focusing on how stakeholders have engaged with each other to advance BEAMs. Historically, two major assessment methods have emerged at some point in both geographical situations promoted by different stakeholder groups. In the USA, the Green Globes rating systems and the LEED are the two major BEAMs. LEED has its origins in the USA, spearheaded by a coalition of actors that formed the US-GBC in 1993 (USGBC, 2016). Green Globes, on the other hand, has its origins from Canada and was introduced in the USA by the Green Building Initiative (GBI). While LEED and Green Globes are sometimes positioned as comparable in the USA, there are conceptual differences in how the two schemes operationalize the green building concept; with differences in ratings, weightages and environmental criteria.

In Hong Kong, the HK-BEAM and LEED are the two major BEAMs currently used in the industry. However, for the sake of the argument progressed in this paper it is also relevant to take into consideration the development of 'The Comprehensive Environmental Performance Assessment Scheme' (CEPAS). Established in 1996, HK-BEAM was the first method to be developed. The development of the scheme was initiated and funded by the Real Estate Developers Association of Hong Kong (REDA). Though the development of HK-BEAM was championed by REDA, ownership has always been

vested in various organizations independent of REDA. These organizations, starting with the BEAM Steering Committee, the Business Environment Council (BEC) and the Hong Kong BEAM Society, which currently owns and operate HK-BEAM, are non-profit organizations established to assist the adoption of sustainability practices in Hong Kong (see, Cole, 2006; HK BEAM Society, 2016). The development of CEPAS, on the other hand, was an initiative between the Hong Kong government Buildings Department and a number of industry participants, such as a of the larger technical consultancies, that had not been heavily involved in HK-BEAM. The scheme was developed to cater for different building types and to provide alternative means of environmental assessment for buildings in Hong Kong (CIRC, 2001). At the time of its launch in 2005, CEPAS was positioned as addressing environmental concerns which were not fully incorporated in HK-BEAM (Cole, 2006). A comparison of the two assessment methods at the time shows glaring differences in how 'green building' was conceptualized. For example, CEPAS emphasized holistic assessment of environment performance of buildings, from pre-design to operations stages; something which was not considered in earlier versions of HK-BEAM (Buildings Department, 2006). Indeed, the two assessment methods were often portrayed as rival approaches with emphasis on their differences rather than their similarities (Ho *et al.*, 2005). To date no buildings have yet to be CEPAS certified (HKBD, 2014).

With such differences in conceptualization of green building in these BEAMs in their respective countries, with different groups spearheading different methods, a key concern is thus the engagement and support of stakeholders throughout their development and implementation. With HK-BEAM currently the only domestic assessment method in Hong Kong, the question that is of interest in this paper is how we can explain the series of events leading to its rise as the dominant assessment method. In the USA, the contention between the two methods, as observed by Cole (2006), begs the question as to how the two schemes have coexisted since the introduction of the Green Globes rating system around 2005 and what, in the first place, necessitated the need for a second assessment method.

Theory: Strategic Action Fields

The 'theory of fields' as put forward by Fligstein and McAdam (2011, 2012) is a meso-level conceptualization of social interactions that views societies as composed of SAFs. From this theoretical perspective SAFs are the fundamental units of collective action in society. They are social arenas, of all sizes, in which individual and collective actors, such as groups, firms, and organizations contend for resources, privileges, and gains. Fligstein and McAdam (2011: 3) define a SAF as

> a meso-level social order where actors (who can be individual or collective) interact with knowledge of one another under a set of common understandings about the purposes of the field, the relationships in the field (including who has power and why), and the field's rules.

The theory provides a conceptual framework that allows for understanding of how social change occurs. It situates these changes in the social arenas that shape interactions and maps out the identities and interests of the individuals and collective actors who influence this process. These social arenas are constructed on a situational basis as collections of actors (who may be individuals or groups) come to define some issues and concerns as salient. Actors engage with each other in these social arenas on the basis of shared interest and common identity of the issue at stake. They do so not only for material rewards, but also for the existential benefits that a sense of meaning and membership affords. These social arenas, or fields, are interlocked in complex webs with other proximate and distant fields; either vertically or horizontally. A vertical relationship means the exercise of formal authority of one field over another, and a horizontal relationship means no such formal authority exists, but the two fields might yet influence each other.

Using Bourdieu's conception of fields (cf. Bourdieu and Wacquant, 1992), SAF theory argues that actors in the field know 'what is at stake', and have a common understanding of what is going on in the field. However, they retain their own 'interpretive frame' of how the field ought to work and will hence not always be in agreement. Fields are composed of two distinct antagonistic groups of actors, namely incumbents and challengers. Incumbents are those actors who, at any point in time, wield greater influence within the field and whose interest and views are usually reflected in how the field is organized. The purpose, collective identity and dominant ideas of the field are shaped in their interest. The rules in the field also tend to favour them and shared meanings tend to legitimize and support their position in the field. The challengers are those actors with less influence in the field and they occupy a lesser position. While they recognize the dominant influence of incumbents on the shared meanings of the field, and usually conform to the prevailing order, they can actively challenge existing fundamental meanings and relations in the field in order

to improve their own positions. Sometimes, if they are able to fashion a new resonant action frame convincing enough to mobilize other marginalized actors (i.e. forming a collective identity) this will lead to the emergence of a new proximate field.

It follows from the above that a core tenet of SAF theory is that actors are constantly jockeying for position in fields; struggling over what is at stake and taking each other into account in their actions. Actors use their social skills to get the cooperation of others. Social skill is the ability to fashion agreements aimed at the creation of a collective definition of interest and political coalitions. Actors use their social skill to frame lines of action and mobilize others in support of a particular action frame or conceptualization of the field (Fligstein, 2015). In order to secure the cooperation of actors, these frames or shared understandings, must resonate with the various members of the groups. Both incumbents and challengers can deploy social skills to mobilize support and articulate alternative visions of the field. Once a field is already in place, skilled strategic actors working for incumbent groups will act to produce and maintain the status quo by ensuring that the collective set of meanings that define the identities and interests of actors are maintained. Meanwhile, skilled strategic actors in challenger groups will use their skills to fashion new frames in order to advance their position in the field. Contention in the field is a result of actors employing various strategic social skills to advance their own interest. They mobilize their resources and use various forms of collective action to garner the support of other actors.

The theory recognizes the presence and influence of state actors who usually have formal authority to intervene in, set rules for, and legitimize the position of, non-state fields. These state actors form their own unique fields. Actors in non-state fields rely on actors in state fields to legitimize their position and actions and they can take their grievance to the state in an attempt to garner support for their group and to stabilize rules that favour their position in the field. It is not uncommon that new SAFs emerge as a consequence of actions in state fields (Fligstein and McAdam, 2011). For example, as soon as a law is set in place, organizations or groups can move in to take advantage of the new opportunities the law creates for strategic action. However, state fields can also intentionally or unintentionally undermine an existing field through direct and indirect actions.

Finally, in addition to incumbents and challengers, SAF theory also proposes the presence of governance units. These units are established to oversee compliance with the rules in the field, and assist with the overall functioning of the field. They 'are internal to the field and distinct from external state structures that hold jurisdiction over all, or some aspect of, the field' (Fligstein and McAdam, 2011: 8). Examples of these governance units are industry trade associations and certification boards or organizations; and in the case of this study, Green Building Councils, and various BEAM certification organizations established to oversee the adoption and implementation of assessment methods. Governance units usually bear the imprints of the most powerful actors in the field and the logics that are used to justify that dominance. The governance units are, therefore, there to reinforce the dominant logic and protect the interest of incumbent actors.

'Green building' and the emergence of BEAMs

Through the SAF lens it can be argued that the sustainability movement (broadly defined) has triggered collective actions by a variety of industry actors to advance practices deemed environmentally friendly. These collective actions are a result of actors' engagement with each other not only to strategically advance their individual 'green building' interest, but also to consider the benefit of a collective identity. In most developed countries, actors championing these collective actions have succeeded in mobilizing resources to secure the cooperation of others to forge a collective identity for green building, culminating in the emergence of various social arenas or fields for green building. It can be argued that these social arenas for green building provide a platform for actors to overcome the uncoordinated activities and uncertainties that exist at the nascent stages of the sustainability movement in any geographical context. The creation and establishment of BEAMs (or in many cases the import of BEAMs from other countries) by these collective groups is thus a way of introducing action frames to codify practices, and to alleviate ontological anxiety with regards to green building. Assessment methods used by actors, therefore, specify which set of practices are 'green' and which ones are not, show actors which actions are legitimate, and reflect actors' understanding of green building.

While the respective SAFs could permit the different and often conflicting points of view and interests of actors to be considered in the specification of green building practices, it is important to note that not all stakeholders have equal stakes in green building or equal abilities, capabilities and resources to engage. Different stakeholders are driven by different goals. These actors have different field activities and responsibilities, as well as different areas of influence with regards to green building. In other words, the drivers for

developing, constructing, acquiring, maintaining, and occupying green buildings vary across different stakeholders.

It follows from the above that contestation and debate over the framing of green building in new assessment methods, or how imported schemes are localized to fit a particular geographical context, are inevitable. The varied goals of actors could, for example, translate into a situation where more powerful actors use resources at their disposal to promote a perspective of green building that will advance their interests. However, to the contrary, less powerful actors may join forces to promote a conceptualization of green building that resonate with their views on green building, which advances their interests. Here it is important to note that while some collective actions will be pursued for the benefit of the collective good, others will likely be pursued on the basis of self-interest. As pointed out by Lutzkendorf *et al.* (2011), financial stakeholders may want to be involved in furthering sustainability not due to altruistic reasons, but in order to meet their own interests and goals. This assertion is clearly not unique to financial stakeholders and could be applied to most stakeholders associated with green building. In such a contested environment, mobilizing support to establish assessment methods can be challenging.

Mobilization of support for the establishment of BEAMs

Mobilization of support to introduce BEAMs in a given SAF depends on who is championing the collective action and the resources these actors can mobilize to sustain the coalition. This is critical in terms of the credibility of the assessment method for the broad range of industry and client stakeholders, and for the human and financial resources available to maintain and implement the method (Cole, 2005). These resources, especially political support from state actors, are significant in mobilizing stakeholders and ensuring widespread use of the assessment methods. For example, if collective action efforts to introduce an assessment method are championed by state actors (i.e. in the case of state-led BEAMs) adoption and use can be enforced through legislation. State-led assessment methods, such as the Singapore Green Mark Scheme, are implemented as mandatory assessment methods. In the case of Singapore, minimum certification from the method is required for development approval (BCA, 2016). However, the development and establishment of voluntary industry-led methods face significant challenges in terms of the organizational and social skills needed to mobilize actors and ensure collaboration. There are also constraints in terms of the regulatory power as, unlike state-led methods, voluntary industry-lead methods are prone to rejection if they do not resonate with industry professionals (Schweber, 2013, 2014).

While actors can lobby state support for the creation and subsequent development of industry-led BEAMs, a key issue for actors championing collective action efforts is finding a way to unite actors with diverging interests voluntarily. The varied views, goals and interests of the actors involved means that collective actions can culminate in the emergence of various parallel proximate fields for green building. Hence, just as members in these fields may end up competing with each other, different SAFs promoting different methods may also compete with each other. Each SAF will be advocating for their standard set of practices to be recognized by others in the industry, or be seen as the industry or national standard. It is, therefore, not uncommon for competition to exist between different proximate SAFs promoting different standards. Actors in proximate fields will engage with each other in multiple ways, employing various strategies with the objective of gaining recognition by state agencies. Thus, enabling them to influence policy, develop their social networks, protect their interests and concerns, and increase their own status. Collective action efforts, can therefore, as asserted by Boström *et al.* (2011: 8) be seen as 'a way for actors to keep an eye on other stakeholders', to know what others are doing, and to act strategically in their own interest. Accordingly, in such an environment, the creation of a single BEAM to communicate green building practices across diverse professional fields is, not an easy task, and perhaps improbable.

The green building field: cases in Hong Kong and the USA

For the purpose of this paper, the green building field is conceptualized as those actors involved in the realization of certified green buildings. It is within this field that individuals and groups of stakeholders have coalesced into various groups and supported the import or development of assessment methods to categorize and certify green building practices. The struggle in this field is about who gets to decide what 'green building' is, and what qualifies as a legitimate green building practice. While actors in the building industry may have a common understanding of 'what is at stake' (i.e. green building), it is self-evident that involved actors may have varied views about how to address environmental issues. In such an environment, stakeholders who seek to promote a particular conceptualization, or influence the

meaning of green building, will employ myriad social skills to develop 'collective action frames', or schemes that resonate with other actors. These actors must possess adequate resources (financial, social, political, etc.) to spearhead the collective action of mobilizing the diverse groups of actors interested in green building. For example, in the establishment of a green building guideline in the City of Santa Monica, USA Theaker and Cole (2001) observed the presence of industry champions who initiated the collaborative projects of mobilizing diverse stakeholders to come together to develop green building guidelines. The study observed how private sector and public sector stakeholders came together to commission a consulting team to develop 'Green Building Design and Construction Guidelines'. According to the authors, and concomitant with one of the propositions of field theory, the more influential these champions are the better their chances of being able to mobilize others. These champions should be able to communicate the benefits of such a collective endeavour to others, and potentially use their social skill and influence to lobby and garner the support of state actors to establish the assessment method.

In Hong Kong, the mobilization of various stakeholders by REDA to develop the Hong Kong BEAM can be viewed in the same light as the findings of Theaker and Cole (2001). The actions of a few large real estate developers on the Hong Kong market led to the establishment of a widely recognized assessment method (HK-BEAM), as well as the establishment of the HK-BEAM Society and the Hong Kong GBC to promote the adoption and implementation of green building guidelines. Similarly, in the USA, the GBC and the GBI can be viewed as outcomes of collective action efforts by various stakeholder groups to institutionalize green building practices deemed 'good'. These types of organizations that own and operate assessment methods (e.g. HK-GBC, HK-BEAM Society, GBI, and US-GBC) take on the role of governance units established to oversee the implementation of, and adherence to, rules regarding the adoption of green building practices.

From a field theory perspective, the collective understanding of green building in a particular social group will be influenced by the most powerful actors in the group. As such, they will have greater impact on the development of assessment methods and on the operationalization of the green building concept. However, marginalized actors (challengers) in the field can use their social skill to change the underlying meaning of green building by promoting their own set of action frames that advance their interest. These actors can engage in various strategic actions by, for example, making sure that they are part of the technical committees set up to develop new or amended versions of assessment methods. This is synonymous with how the membership of the Hong Kong BEAM steering committee has evolved. While the majority of the actors involved in the development of the first editions of the assessment method mainly were affiliated with a small group of notable real estate developers, membership has over the years changed considerably. The most notable change happened in 2005, when a large consultancy firm championed the introduction of a new assessment method (CEPAS) onto the Hong Kong market. After this episode the membership was expanded to involve a broader range of actors. This introduction of CEPAS in 2005 is also a good example of how marginalized actors with shared interests and understanding of green building can promote new collective identities and frames and lobby for support from state actors. In this case, actors who were not involved in the development of the first set of HK-BEAM (BEAM for New Office Designs (Version 1/96) and Existing Office Premises (Version 2/96)), partnered with the Hong Kong Buildings Department to mobilize support to introduce a second assessment method – CEPAS (CET, 1999; Cole, 2006).

It follows form the above that, if challengers in one field fail to advance their views on green building, and thus fail to influence the development of BEAMs, they can decide to support the development of BEAMs that promote a conceptualization resonating with their core beliefs and that advances their interests. This is in line with the actions of the Wood Promotion Network and a number of other industry groups who were not allowed to join the US-GBC and, while objecting to various provisions in the US-LEED, decided to provide support to establish the Green Globes in the USA. Cole (2006) observes how owners of the US-LEED and the Green Globes have positioned these two schemes as competitors in the US market. They have as such created proximate green building fields. Similarly, in Hong Kong, CEPAS was promoted as offering something different, by addressing issues not considered in HK-BEAM (Ho *et al.*, 2005). It did, however, ultimately fail to make an impact on the market.

In both cases above, it is obvious that actors who disagreed with how green building was framed in the existing assessment method, or who felt marginalized by their exclusion in the development of the first set of schemes, decided to introduce another assessment method. This is evidenced by how these coexisting schemes in their respective geographical context are positioned, not just as competing schemes, but as offering varied conceptualizations of green building (Cole, 2006). This kind of competition between collective groups promoting

different assessment methods also shows the relationship between incumbent groups and challenger groups. As challenger groups will try to change existing definitions of green building, the incumbents will try to resist this change, either by using their social skill and resources to maintain existing definitions, or by proposing something new that will ensure their position as incumbents. Thus, even as there will be contention within individual collective groups promoting separate assessment methods, these groups will also be competing with each other in the broader field environment. For the case in Hong Kong, attempts to introduce CEPAS ultimately failed and the scheme was integrated in the existing assessment method (i.e. HK-BEAM).

Discussion and implication

Green building: a diachronic view

In this paper, we argue that BEAMs have emerged to operationalize the green building concept by specifying which practices are sustainable and which are not; and in extension what products, technologies, and practices that are possible (acceptable) on construction projects. We also argue that while these schemes have emerged to promulgate a particular understanding of 'green building', actors with varied professional backgrounds and expertise may have different views on how best to operationalize it (cf. Schweber, 2014). The heterogeneous nature of professional practice and expertise in the building industry means that different professional actors may hold different views about the concept, influenced, according to SAF theory, by their respective interpretive frames (cf. Bresnen, 2013). That is, it is obvious that an engineer's conceptualization of the concept will be different from an architects, and an engineer or architect working for a property developer may espouse different views from his/her counterpart working for a consultancy firm or builder. Furthermore, it is very likely that these views will be influenced by the interests and biases of the respective stakeholder groups they are affiliated with. Thus, in any market, how 'green building' is framed in BEAMs, or how imported schemes are modified to fit the local context, will be influenced by the varied positions of industry stakeholders (developers, contractors, consultants, suppliers, trade associations, etc.); with different groups attempting to promote a particular conceptualization that resonates with their logic of operation, and which possibly advances their own interests in the industry.

The above argument is based on the assumption that the meaning of the concepts 'sustainability' and 'green building' is the object of ongoing negotiation (cf. Schweber, 2013). That is, as the definition of 'sustainability' and 'green building' keeps changing, triggered by changes in national and international policies, the various groups of actors with interests in green building will frame the new definitions based on their collective intersubjective understanding and interpretation of the concept. Due to this conceptual fluidity, and the plurality of actors' views, green building practices codified in assessment schemes will keep on changing and the boundary of the field defined by any collective group of actors advancing a particular conceptualization of the concept will also be in constant flux; shifting as the shared meaning of actors in the field keeps changing. 'Green building' can, thus, be viewed as a historical construct that has evolved since its emergence and which will keep on changing as new environmental issues become salient. Its definitions and meanings are intersubjective constructs of what some collective group of actors have come to accept as what an environmentally friendly or sustainable building should be, achieve or accomplish. In consequence, the green building field can be conceptualized as an intersubjective social order that mutates over time as the views and interests of the collective group of actors change. It follows that, at every stage in the evolution of green building in the industry, it is possible for alternative conceptualizations (with associated action frames and collective identities) of green building to coexist simultaneously; championed by different powerful actors, with each actor espousing and promoting different practices.

This foregoing argument suggests that green building is best understood not as a static concept, but as a historical and cultural phenomenon that reflects the power of some actors over others. From this perspective BEAMs emerge to codify practices and are an outcome of ongoing negotiated shared meanings/understandings of green building; a product shaped by political contestation over which practices are 'green' and which ones are not, and influenced by how actors jostle over reification of the concept. Consequently, the establishment of BEAMs to define a given set of acceptable practices can, therefore, be fraught with power struggles among industry actors; as to who wins and who loses in the debate over which standards and practices become adopted (Janda and Killip, 2013). The corollary is the variability in how green building has been framed in different BEAMs and the emergence of various stakeholder groups promoting alternative variants of BEAMs, even in the same geographical context.

Research implications

We have here started to explore the historical context from which BEAMs have emerged and how green

building has been operationalized in BEAMs. Our argument rests on the need to understand how some industry actors have, over time, managed to influence the development of BEAMs. Indeed, how green building has been operationalized in BEAMs has significantly changed over the years, triggered by a constant influx of new actors and experts with vested interest in green building. At the nascent stages of green building, when there was little awareness of sustainability issues and when industry actors had little to no knowledge about sustainability, few actors championed the development of BEAMs. However, increasing public awareness and professional understanding of the concepts 'sustainability' and 'green building' have meant an increase in contestation over how green building is framed.

Indeed, over the years, the general perception of what constitutes a 'green' or 'environmentally friendly' building has changed considerably. Different views have emerged regarding how green buildings should be designed and constructed. These views are influenced by the emergence of new strategies, construction methods, technologies, materials, etc. Among professional architects and designers alone, Guy and Farmer (2001) highlighted the conceptual challenges of the meaning of green building and identified six competing logics of ecological design (i.e. eco-technic, eco-centric, eco-aesthetic, ecocultural, eco-medical, and eco-social) and showed how these reflect alternative visions of sustainable architecture. Likewise, according to Stenberg and Räisänen (2006), the conceptualization of green building, in general, can range from a techno-centric focus, with emphasis on energy saving, indoor climate, building materials; to an affective eco-sensitive outlook, focusing more on protection of people's working environments, aesthetics, and individual lifestyle. This emerging plurality of views as to what green buildings should be, achieve or accomplish, allows competing ideologies and special interests to gain prominence and to influence the development BEAMs. In consequence, the question of which environmental indicators to use, how to apportion the weightage criteria, and which specific set of practices to advance is becoming ever more complicated.

The challenge faced in most countries, nowadays, is thus, how to operationalize emerging new ideas into practices that resonate with professional actors in the building industry. As observed by Schweber (2014), the challenge is how to combine the multiple types of technical knowledge of the various experts involved in green building to develop a scheme that resonates with professional actors operating in different professional jurisdictions. That is, how can emerging strategies, approaches, ideas, etc., be framed in BEAMs; which groups of industry professionals will champion the process; and how will their biases and interests influence their development?

While it might be difficult to predict how BEAMs will evolve in the future and how industry actors will go about this process, some valuable observations can be made by exploring how these assessment methods have been created, and how the actions of the various interested parties have influenced their development. This is important because how assessment methods are developed will influence the willingness of professional actors to engage with, and adopt, the practices they promote. Exploring how professional actors with vested interest in green building have championed the development of BEAMs, what the basis of their power is, and the tactics they employed to enforce that power, could illuminate our understanding of why some emerging ideas, construction methods, materials, technologies, etc., are given priority in the industry over others. This will also shed light on why, and how, some professional actors have risen to dominate the field of green building, and why others may have tweaked their professional practices to align with the views of these dominant actors.

We, therefore, argue for the need to broaden the scope of research on green building in general, and BEAMs in particular, from merely focusing on their formal features and technical aspects to also recognize and reflect on the 'taken-for-granted' assumptions around technology, sustainability, and dominant practice. This means moving away from the dominant technologically driven research agenda (cf. Schweber and Leiringer, 2012) and opening research to a broader range of understandings of how the building industry is configured, and the formal and informal rules and structures that govern firm behaviour. We have, in this paper, sought to provide a theoretical basis to do so.

Concluding remarks

Beginning with the development and use of ad hoc templates and guidelines and moving on to the establishment of comprehensive systems for assessing the environmental impact of buildings, adoption of the concept 'green building' has relied on a bevy of industry professionals, specialists, and various other interest groups; both within and outside the boundaries of the building industry. The challenge for these myriad actors as they have grappled with adopting the concept 'green building' has been how to advance a unitary set of acceptable practices. With the emergence of BEAMs to codify green building practices, much hope has been put on their establishment through collective action efforts to unite the diverse interested parties and to forge a collective identity around environmental issues. While progress

has been made in some countries, evidenced by the presence of some well-recognized BEAMs, competition within and between collective groups promoting BEAMs is inevitable. Variability in the meaning of green building among stakeholders, together with continuously shifting policy targets, makes the assumption by some researchers that BEAMs could rise to provide a common unifying language for all stakeholders seem unattainable.

The tendency for different collective groups of actors to uphold varied conceptualizations of green building is very likely to persist in many countries. In the future, it is possible for new assessment methods to emerge when groups of marginalized industry actors recognize an opportunity to change existing practices. These actors may want to advance their interest by trying to change the underlying meaning of green building in the industry, thereby introducing new criteria in existing BEAMs, or developing an entirely new assessment method. This means that, during the development of BEAMs, or updated versions, we may expect the multitude of actors with vested interest in green building to each seek to advance a perspective of the concept which advances their interests. Change in the existing underlying meaning of green building will occur when actors championing an alternative conceptualization of green building are positioned to change practices codified in BEAMs. Even so, as long as existing conceptualizations of green building continue to support the interest of dominant actors in the industry, these powerful actors will work to maintain the status quo. The ability of actors to influence this process will depend on their bargaining strength, and actors will mobilize several resources at their disposal to achieve a designed outcome. This conflict over how best to operationalize green building, that is, which environmental indicators to use, what weightage criteria to adopt, and even which environmental objectives these indicators should address, could lead to variations in the framing of green building, and the possible emergence of multiple BEAMs. With much hope placed on BEAMs to foster sustainability, the contested nature of their development raises important questions as to whether practices advanced in BEAMs encapsulate authentic measures of the principles of sustainable development, and to which degree they truly reflect the collective knowledge of industry actors. It also raises questions regarding their place in policy and their role in achieving more sustainable products and processes.

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